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Geometric theory of differential systems: Linearization criterion for systems of second-order ordinary differential equations with a 4-dimensional solvable symmetry group of the Lie-Petrov type VI 1

Aminova A., Aminov N.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

In the framework of projective-geometric theory of systems of differential equations developed by the authors, this paper studies the group properties of systems of two (resolved with respect to the second derivatives) second-order ordinary differential equations whose right-hand sides are polynomials of the third degree with respect to the derivatives of the unknown functions. A classification of such systems admitting four-dimensional symmetry group of the Lie-Petrov type VI 1 is given. For each of the systems, a necessary and sufficient linearization criterion is obtained, i.e., the authors find the necessary and sufficient conditions under which, by a change of variables, the system can be reduced to a differential system whose integral curves are straight lines and are expressed by three linear parametric equations or two linear equations with constant coefficients. For all linearizable systems, the linearizing changes of variables are indicated.

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